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AUTHOR Durham, Meenakshi Gigi
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ABSTRACT

This study hypothesized that altering a news story to conform to a more familiar structure might increase comprehension and recall. Subjects, 104 undergraduate students, completed a Media Use Survey, a questionnaire for collecting demographic information, the WIRE test, a strength of text schema measure, and a comprehension questionnaire. Students read a stimulus passage rewritten to follow either a news, narrative, or expository text structure. The three hypotheses focusing on short-term and long-term retention of the text content were partially substantiated. Hypotheses which predicted that comprehension of a story's content would be affected by manipulation of the story's structure were not fully supported. In-depth analysis of the recalls showed that key facts were equally well remembered in all three versions of the panther passage, but only well remembered in the expository and news versions of the uprising passage. Results indicated that recall was significantly affected by the structure of a passage and the strength of readers' text schemas; comprehension appeared to depend on prior knowledge of the passage's topic. (Seven tables of data are included, and 93 references are attached.) (MG)

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Is It All In the Telling?: A Study of The Role of Text Schemas and Schematic Text Structures in the Recall and Comprehension of Printed News Stories

Meenakshi Gigi Durham
Ph.D. candidate
Graduate Division
College of Journalism and Communications
2000 Weimer Hall
University of Florida
Gainesville, FL 32611
(904) 392-4644 (work)/ (904) 371-7194 (home)

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ABSTRACT

Is It All In the Telling?: A Study of the Role of Text Schemas and Schematic Text Structures in the Recall and Comprehension of Printed News Stories

Based on schema-theoretic approaches to the reading process, it was hypothesized that altering a news story to conform to a more familiar structure might increase comprehension and recall. Subjects (n=104) read a stimulus passage rewritten to follow either a news, narrative, or expository text structure. Recall was significantly affected by the structure of a passage and the strength of readers' text schemas; comprehension appeared to depend more on prior knowledge of the passage's topic.

Is It All In the Telling?: The Role of Text Schemas and Schematic Text Structures in the Recall and Comprehension of Printed News Stories

News stories have traditionally been aimed at the presentation of information in a clear, concise manner designed to render the news content of a story accessible to as large a number of receivers as possible (McCombs & Becker, 1979, p. 18). Reporters are exhorted to write simply and clearly, using short sentences and familiar words (cf. Berner, 1984; Hutchison, 1986; Jones, 1978). Mencher (1984) notes, "News is information people need in order to make rational decisions about their lives" (p. 77). If the information is meant to be useful, it follows that an ideal news story would be one that a reader could easily comprehend and also could easily recall when the information in it needs to be retrieved.

Research Question and Justification for This Study

The goal of this research was to investigate a specific domain within the broad topic of schematic cognition and its bearing on the comprehension and recall of news. In particular, this study focused on the structure of print news messages and the ways in which readers' schemas for such structure influence their interaction with the content of the messages.

Recent research indicates that comprehension and recall are interactive operations in which a reader brings his or her prior knowledge into play while encoding new information and later activates that knowledge for retrieval of the information (e.g.

Bobrow & Norman, 1975; Schank & Abelson, 1977; Pearson, Hansen, & Gordon, 1979; Graesser & Nakamura, 1982; Freebody & Anderson, 1983; Stahl & Jacobson, 1986). The theoretical position on which these findings are predicated is known as schema theory.[1]

The Concept of Schema

In general terms, for the purposes of this study, a schema may be defined as a dynamic, generic mental framework for the hierarchical representation of knowledge. Anderson (1977) asserts, "A schema represents generic knowledge; that is, it represents what is believed to be generally true of a class of things, events, or situations" (p. 2). Each schema contains slots for its various components: for example, a rudimentary schema for a human face would contain slots for eyes, a nose, a mouth, and ears. Each new face encountered by an individual with this schema would present new information that could easily be fitted into these slots. Schemas are generally created, or instantiated, through experience; once in place, they are key to innumerable cognitive processes. The notion of a schema was first used in studies of memory and remembering and was later applied in the study of reasoning, learning, language processing, problem solving, reading, and countless other cognitive and psychosocial processes (see Bartlett, 1932; Minksy, 1974).

Graesser and Nakamura (1982), in an extensive exposition on the role of schemas in comprehension and memory, define schemas as "generic knowledge structures that guide the comprehender's

interpretations, inferences, expectations, and attention. A schema is generic in that it is a summary of the components, attributes, and relationships that typically occur in specific exemplars" (pp. 60-61).

Fiske and Taylor (1984) refer to a schema as "a cognitive structure that represents organized knowledge about a given concept or type of stimulus" (p. 140). In their view, a stored schema represents pre-existing knowledge about a given topic and also guides the assimilation, interpretation, and subsequent recall of incoming information. They note that "cognitive research on the role of generic prior knowledge has demonstrated the importance of schemata in basic processes of understanding and memory" (p. 145).

An essential aspect of the concept of schema concerns the notion that schemas are active rather than immutable or static; schemas perform a variety of different operations and are constantly modified, altered, and elaborated as cognitive processes occur (see Piaget, 1952; Rumelhart, 1980).

Schema-Theoretic Information Processing and Its Application to the Mass Communication Model

In the schematic view of cognition, incoming information is encoded and stored via an appropriate schema, or pre-existing mental knowledge structure. Graesser and Nakamura (1982) recognize two stages in the functioning of schemas during learning: schema identification and schema application. During

schema identification, the learner selects a schema which matches some aspects of the input data. Here, the incoming information "matches the components, attributes, and relationships of a particular schema better than alternative schemas" (Graesser & Nakamura, 1982, p. 62). Once an appropriate schema has been identified, schema application, the second stage, ensues. In this stage of information processing, the schema directs the perception and interpretation of new information and provides the prior information necessary to comprehend the new information.

Variations on this model of information processing have been developed (cf. Norman & Bobrow, 1976; Rumelhart, 1980), but the fundamental mechanism remains essentially the same in all of them. Schemas play a crucial and multifold role in the processes of comprehension and memory. Schemas generate a wealth of prior knowledge essential for understanding, they organize and format incoming information, and they provide an efficient mechanism for the retrieval of stored information.

These operations are all necessary in the comprehension and recall of news and other messages generated via the mass media.

Much of the existing research on the processing of mass media news messages focuses on memory for news, although a few studies do address the issue of comprehension of news stories. Very little empirical evidence is available to support existing hypotheses on these topics, and that which exists focuses primarily on the quantification of news recall (Booth,1970;

Neuman, 1976; Gunter, 1980, 1981; Findahl & Hoijer, 1975, 1981, 1985; Edwardson, Grooms & Pringle, 1976; Edwardson, Grooms, & Proudlove, 1981; Edwardson, Kent, & McConnell, 1985). In a departure from the strictly numbers-oriented tradition of this line of research in mass communication, Woodall, Davis, and Sahin (1983) incorporated a variety of experimental findings to propose a theoretical framework for memory and understanding of news based on principles of episodic memory and on the trace theory of memory and understanding. Other studies which have explored cognitive aspects of news processing have shown that prior knowledge is vital to the comprehension and recall of news (cf. Findahl & Hoijer, 1981; Findahl & Hoijer, 1985) and that schema-based strategies are employed in processing information gained from news (Graber, 1988). Donohew, Finn, and Christ (1988) examined the complementary roles of affect, schemas, and cognition in the processing of news.

Text Schemas, Text Structures and the Reading Process

Cappella and Street (1989) point out that "because any definition of communication assumes a sender and a receiver, every definition of messages within a system of communication must be concerned with the message as received" (p 25). Numerous studies indicate that a reader's familiarity with the way in which information is organized in a text has a significant impact on how well he or she comprehends and remembers it (Adams & Collins, 1977; Anderson, 1977; Marshall & Glock, 1978-79; Taylor,

1980; Pearson & Camperell, 1981; McGee, 1982; Whaley, 1981a, 1981b; Gourley, 1984; Rumelhart, 1985; Bower, Black, & Turner, 1985; Ruddell & Speaker, 1985). Research also demonstrates that different types of text have underlying "grammars" or linguistic structures that depend on the goal of the text--narrative structures have been identified for simple fiction stories (Rumelhart, 1975; Mandler & Johnson, 1977; Stein & Glenn, 1979), and a variety of structures have been found for various types of non-fiction text (chronological, taxonomical, persuasive, directive, expository, etc.; see Gillet & Temple, 1986, pp. 247-254). Van Dijk (1983, 1988) has even identified an underlying structure for hard news stories.

Story grammars are usually the first text structures acquired by readers, through early exposure to stories in childhood (Applebee, 1978; Hoover, 1981). Nonfiction structures are learned later, generally from the third grade on (Gillet & Temple, 1986, p. 49). Richards (1978) has observed that many students who are reading fluently in the beginning grades start to experience reading problems in the fourth and fifth grades, when a greater amount of non-fictional material is introduced into the curriculum. She speculates that this phenomenon is largely due to the children's lack of familiarity with text structures other that of the fictional narrative.

In his book Remembering, Bartlett proposed that recall of written material depends on a reader's schema for the structure

of a written passage (Bartlett, 1932). Mandler and Johnson (1977) refer to a story schema as "an idealized representation of the parts of a typical story and the relationships among those parts" (p. 112). The mental representation of the structure of a text will be referred to hereafter as a "text schema."

In theory, all text is assumed to be structured according to some specific pattern of underlying organization, also known as a "text grammar" (Rumelhart, 1975; Rumelhart, 1977; Mandler & Johnson, 1977; Meyer, 1977a, 1977b; Stein & Glenn, 1979; Marshall & Glock, 1979; Taylor, 1980; Taylor & Samuels, 1983).

The basic organizational pattern of the Mandler & Johnson (1977) story grammar for narrative text comprises the following elements:

1. The <u>setting</u> of the story: The protagonist, and possibly other characters, are introduced; the temporal and physical locations of the story are indicated; any other information is provided which may assist the reader to follow the events that follow.
2. An <u>event</u> (described by Gillet & Temple, 1986, as an "initiating event"): an action or idea that precipitates further story developments.
3. An <u>internal reaction</u>, which may be either <u>simple</u> or <u>complex</u>: When the character's internal reaction leads to a single action, it is termed a <u>simple reaction</u>; when the internal reaction results in the setting of a

goal, which is followed by an attempt to reach that goal, the internal reaction is a complex reaction.

4. An outcome: This is the result of the protagonist's attempt to arrive at the goal set in the internal reaction. If the outcome is not successful, the protagonist may try again, with an different outcome. The pattern may thus be repeated within a story.
5. An ending: A state of affairs in which the story is wrapped up "with a dramatic flourish" (p. 124).

The expository text structure is written with the purpose of describing or explaining something. Meyer (1975) notes that recall of expository prose is primarily a function of recognizing superordinate (or top-level) and subordinate (lower-level) structural propositions in the text. She has identified several types of organizational structures and relationships characteristic of nonfiction texts. These include taxonomical, chronological, cause and effect, directive, comparison and contrast, and enumerative or attributional. These organizational schemas are acquired gradually through long-term exposure to different discourse types.

Bartlett (1978) found the enumerative or attributional structure to be the most common type of textbook organization. An outstanding feature of the attributional expository text

structure is the theme paragraph, where each paragraph begins with a topic sentence synopsizing the paragraph's content, followed by elaborative sentences.

Previous studies have demonstrated that a knowledge of story grammars, i.e. the presence of story schemas in readers, facilitates both reading comprehension and recall of stories (Mandler, 1978; Stein & Nezworski, 1978; Fitzgerald & Spiegel, 1983; Spiegel & Fitzgerald, 1986; Fitzgerald, 1984; van Dijk & Kintsch, 1985).

Similarly, it has been shown that knowledge of nonfiction text structures helps readers better recall and comprehend nonfiction text (Meyer, 1975; Meyer, 1977a, 1977b; Meyer, Brandt, & Bluth, 1980; Meyer & Freedle, 1979; Taylor & Samuels, 1980; Mulcahy & Samuels, 1987; Ohlhausen & Roller, 1988).

Schemas for the Structure of News Stories

Research which integrates cognitive science, schematic views of reading, and the processing of news information is relatively new. News stories would appear to combine the characteristics of narrative and expository text and thus possess a structure uniquely their own. That news stories follow a set structural pattern is a notion which has been intuitively acknowledged as true for many years. In the textbook Writing for Mass Communication, Hutchison (1986) points out that all hard news stories should have a formal structure, beginning with a lead:

> In a good lead, the important things come first. They provide the umbrella under which all details of the story will fit comfortably. . . .The details usually flow from the lead in order of descending importance into the succeeding paragraphs. A simple news story about a minor traffic accident or a minor house fire will look like an inverted pyramid. . . . (p. 125)

The structuring of hard news stories is in fact so entrenched in the newswriting process that Tuchman (1978) claims that most news stories consist of prestructured patterns of words into which reporters insert "factoids."[2]

The traditional "inverted pyramid" structure of hard news stories corresponds to the concept of a schematic structure or text grammar. Van Dijk (1983, 1988a, 1988b) observed that a news story can be viewed in terms of schematically structured discourse. Using cognitive models, Van Dijk examined media discourse and its representation in memory, and his analysis of newspaper stories led him to postulate an underlying macrostructure (i.e., a structure for a text as a whole) for news stories.

In his studies, van Dijk analyzed news stories from a number of international newspapers; however, the macrostructure he proposed does not correspond very well with the average hard news story found in American newspapers, especially with regard to the last category in the structure--the "Comments" category, in which

the news event detailed in the story is analyzed and evaluated in its societal context. In general, breaking news stories produced in the United States do not include evaluations or predictions of possible implications of the events being reported.

Newsom and Wollert (1988, p. 120) determined that most news stories have the following elements:

1. The lead (the main point)
2. Secondary points in a tie-in transition
3. Elaboration on the main point
4. Support for the lead
5. Background
6. Development of the main idea
7. Details

They offer two diagrammatic representations of the inverted pyramid: the "traditional" inverted pyramid and the "modified" inverted pyramid.

For the purposes of this study, Newsom and Wollert's modified inverted pyramid structure was adopted as the typical structure for a breaking hard news story in an American newspaper. Unlike the van Dijk structure, the Newsom and Wollert modified pyramid does not include any subjective elements such as comments on or analyses of the events contained in the story: the absence of these elements is far more typical of American news stories. Secondly, the Newsom and Wollert modified pyramid includes quotes and the possibility of a secondary theme in the

story, which more complex news stories often contain; the traditional pyramid does not contain these elements.

A few researchers have examined the role of the structure of news text in the cognitive processing of news messages (cf. Thorndyke, 1977; Green, 1979; Housel, 1984; Nolan, 1989), but none have used the text grammars identified as being endemic to narrative and expository text in systematic manipulations of text structure.

In the studies noted above, the schematic structure of text has been shown to significantly affect readers' recall and comprehension of the information contained therein; similarly, the degree of readers' familiarity with text structures--i.e., the strength of their text schemas--has been demonstrated to affect their comprehension and recall of the text content. The extent to which these relationships hold true in the case of printed news messages was the focus of the present research.

Method

To explore the connection between the schematic organization of news stories and the receiver's cognitions regarding the news message, an experimental study of the relationships between these variables was undertaken. Green's (1979) hypothesis that the organization of news stories hinders comprehension and recall of the message was empirically tested; in addition, the significance of the existence of a reader's schema for news story structure was investigated under experimental conditions.

The simple story grammar and the expository text structure were selected as the text grammars with which to compare the inverted pyramid news story structure. Readers' schemas for these patterns were also measured to gauge the extent to which strength of text schema affected information processing from a printed news story.

Hypotheses

In general, it was hypothesized that the highest recall for a story would occur for the narrative grammar, the next highest for the expository text grammar, and the lowest for the news story grammar. Similarly, comprehension was expected to be highest for the narrative story grammar, next highest for the expository text grammar, and lowest for the news story grammar. In addition, it was hypothesized that the more highly developed the reader's text schema, the greater the recall and comprehension of materials presented using that text grammar.

For ease of later discussion, these general hypotheses were broken down as follows:

H1: A story organized according to a narrative story grammar will be better remembered in the short term than a story organized according to a news story grammar.

H2: A story organized according to an expository text grammar will be better remembered in the short term than a story organized according to a news story grammar.

H3: A story organized according to a narrative story grammar will be better remembered in the short term than a story organized according to an expository text grammar.

H4: A story organized according to a narrative story grammar will be better remembered in the long term than a story organized according to a news story grammar.

H5: A story organized according to an expository text grammar will be better remembered in the long term than a story organized according to a news story grammar.

H6: A story organized according to a narrative story grammar will be better remembered in the long term than a story organized according to an expository text grammar.

H7: A story organized according to a narrative story grammar will be better comprehended than a story organized according to a news story grammar.

H8: A story organized according to an expository text grammar will be better comprehended than a story organized according to a news story grammar.

H9: A story organized according to a narrative story grammar will be better comprehended than a story organized according to an expository text grammar.

The following hypotheses were postulated to find a theoretical basis for the results of the above investigations:

H10: Readers with highly developed schemas for a particular text structure will have higher recall of that type of text than readers with weak schemas for that structure.

H11: Readers with highly developed schemas for a particular text structure will have better comprehension of that type of text than readers with weak schemas for that structure.

The experimental design

The overall experimental design comprised a single-factor posttest-only procedure. The manipulated variable was text structure; the response variables were short-term recall, long-term recall, and comprehension. The experiment consisted of six tasks.

Subjects

Fifteen subjects per cell were computed to be required to minimize Type II error at a 0.05 level of significance. Thus, since there were six cells in the experiment, 90 subjects were needed for this experiment.

Subjects were undergraduate students at the University of Florida, drawn from senior-level classes in journalism, education, and speech communication. However, not all subjects were majoring in these disciplines. One hundred and four students participated in this study. All students were juniors or seniors. Subjects' ages ranged from 18 to 64.

Method

Two stimulus news stories were rewritten to follow three schematic structures: (a) the prototypical Newsom and Wollert (1988) "inverted pyramid" news structure, (b) the Mandler and Johnson (1977) story grammar, and (c) the expository/attribution text structure described by Meyer (1975). Schema theoretic views of reading suggest that prior knowledge of text content strongly influences reading comprehension and recall (Pearson, Hansen, & Gordon, 1979; Stahl & Jacobson, 1986; Perin, 1988). Thus, two stories were used as a means of replicating the experiment within this study. Both were modifications of AP wire stories. Story I concerned a captive breeding program to conserve the Florida panther; Story II dealt with a fictitious political uprising in Surinam.

Subjects were randomly assigned to one of the six story conditions--Story I news, Story I narrative, Story I expository, Story II news, Story II narrative, or Story II expository.

Each subject received a packet containing the six measurement instruments: the Media Use Survey, the stimulus story, the questionnaire for collecting demographic information, the WIRE test, the strength of text schema measure, and the comprehension questionnaire.

Subjects were first asked to complete the Media Use Survey.

Subjects were then presented with one of the two stimulus stories in one of the three organizational patterns. They were

given sufficient time to read the stories; the stimuli were then removed.

Subjects were next asked to complete a multiple-choice questionnaire requesting demographic information, and secondly they were given the WIRE test.

Next, subjects were tested for strength of text schema by means of an unscrambling task based on three stories constructed according to prototypical narrative, news, and expository structures. These stories were not the same as those used to measure recall and comprehension. Each subject was given a labeled envelope containing a number of slips of paper; each scrap of paper was printed with a node from the stimulus story. Subjects were instructed to organize the pieces of paper so that they formed a typical story of the type printed on the front of the envelope--either news, narrative ("story"), or expository ("textbook"). Once they had arranged the pieces of the story to their satisfaction, they were asked to number the scraps in sequence. Subjects' reorganizations of the story were scored by comparing the relative order of propositions in the subject-generated stories to the original, correctly organized stories. Scores were computed by calculating rank-order correlation coefficients (Spearman's rho) comparing subjects' ranking of the propositions to the rankings in the original stories.

After this series of tasks, subjects were asked to recall the stimulus stories and write them down using language as close

to the originals as possible. Their instructions included the caveat that if they were not able to remember the original wording of the story, approximations were permissible.

Finally, subjects were asked to answer the comprehension questionnaire.

The recall instrument was administered one week later to the same subjects. Subjects were asked to recall the story they had read and write it down using language as close to the original as possible.

Recalls were scored by parsing the subject-generated passages and recording the number of propositions recalled from the original passage for each node in the appropriate text grammar to gain a measure of the overall proportion of information recalled from the original passage. These numbers were converted to percentages.

Results

To test the nine initial research hypotheses, separate one-way analyses of variance were conducted for each story to compare the mean recall and comprehension scores of subjects in each experimental condition.

It will be seen from Tables 1 through 3 that manipulating the structure of the stimulus stories had somewhat different effects on each of the dependent variables.

Overall, it appeared that the subjects' short-term recall of the stories was significantly influenced by manipulation of the

story structure, F (2,50) = 2.881, p = .065 for the panther story and F (2,45) = 3.529, p = .038 for the political uprising story (Table 1).

However, subjects' comprehension of the two stories, as measured by the ten-item questionnaire administered, did not appear to be significantly affected by the experimental manipulation overall, F (2,50) = 1.985, p = .148 in the case of the panther story and F (2,45) = 0.179, p = .836 in the case of the political uprising story (Table 2).

Long-term recall appeared to be significantly affected only in the case of the panther story, F (2,35) = 3.102, p = .057; no significant differences were found for the political uprising story, F (2, 25) = 0.907, p = 0.416 (Table 3).

Table 1

Analysis of variance of short-term recall across story structure

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG OF F
Panther Story					
Story Structure	1424.29	2	712.14	2.881	.065
Residual	12607.04	51	247.19		
Total	14031.33	53	264.74		
Political Uprising Story					
Story Structure	898.88	2	449.44	3.529	.038
Residual	5858.67	46	127.46		
Total	6757.55	48	140.78		

Table 2

Analysis of variance of comprehension across story structure

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG OF F
Panther story					
Story Structure	2471.57	2	1235.78	1.985	.148
Residual	32380.53	52	622.70		
Total	34852.10	54	645.40		
Political Uprising Story					
Story Structure	207.69	2	103.84	.179	.836
Residual	26641.98	46	579.17		
Total	26849.67	48	559.36		

Table 3

Analysis of variance of long-term recall across story structure

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	SIG OF F
		Panther Story			
Story Structure	1007.14	2	503.57	3.102	.057
Residual	6006.75	37	162.34		
Total	7013.90	39	179.84		
		Political Uprising Story			
Story Structure	155.64	2	77.82	.907	.416
Residual	2231.53	26	85.82		
Total	2387.172	28	85.25		

The mean scores on the instruments measuring short-term recall, comprehension, long-term recall, and strength of text schema are given in Table 4, below.

Table 4

Mean scores on the dependent variables in each experimental condition

Short-Term Recall, Panther Passage

	Mean	Difference Narrative	Expository	News
Narrative	31.6	---	-2.6	9.3*
Expository	34.2	-2.6	---	11.9*
News	22.3	9.3*	11.9*	---

Short-Term Recall, Uprising Passage

	Mean	Difference Narrative	Expository	News
Narrative	25.3	---	4.2	18.8*
Expository	21.1	4.2	---	14.6*
News	6.5	18.8*	14.6*	---

Long-Term Recall, Panther Passage

	Mean	Difference Narrative	Expository	News
Narrative	22.2	---	5.7	10.3*
Expository	16.5	5.7	---	4.6*
News	11.9	10.3*	4.6*	---

Table 4 (continued)

Long-Term Recall, Uprising Passage

	Mean	Difference Narrative	Expository	News
Narrative	13.8	---	6.0	7.9
Expository	7.8	6.0	---	1.9
News	5.9	7.9	1.9	---

Comprehension, Panther Passage

	Mean	Difference Narrative	Expository	News
Narrative	52.6	---	-3.8	11.7
Expository	56.4	-3.8	---	15.5*
News	40.9	11.7	15.5	---

Comprehension, Uprising Passage

	Mean	Difference Narrative	Expository	News
Narrative	39.6	---	-4.8	-3.0
Expository	44.4	-4.8	---	1.8
News	42.6	-3.0	1.8	---

*$p \leq .10$

Duncan multiple range tests were conducted to further examine the observed differences in mean scores on the dependent variables and test each of the first nine hypotheses. The level of significance used for the test was .10, rather than the more generally accepted .05, in light of the fact that this experiment was a preliminary study of an exploratory nature.

Effects of Altering Text Structure on Short-Term Recall

Hypothesis 1 was supported in both story conditions--the mean short-term recall scores of subjects who read the narrative versions of the two stories were significantly higher than the mean short-term recall scores for subjects who read the news versions of the stories. Hypothesis 2 was also supported--short-term recall of the expository structures was found to be significantly greater than that of the news structures for both passages. Hypothesis 3 was not supported for either passage--no significant differences in short-term recall were observed between the narrative and expository versions of the two passages.

Effects of Altering Text Structure on Long-Term Recall

Significant differences in long-term recall were observed between the narrative group and the news group for the panther story. Thus, Hypothesis 4 was supported in the case of the panther story but not in the case of the uprising story. Similarly, Hypothesis 5 was supported in the case of the panther story only--the mean long-term recall score in the expository conditon was significantly higher than that in the news conditon. Hypothesis 6 was not supported in either story condition. No substantial differences in long-term recall were seen between the narrative and expository versions of either story.

Effects of Altering Text Structure on Comprehension

Hypothesis 7, addressing differences in comprehension between subjects exposed to narrative and news structures, was not supported in either story condition. Hypothesis 8 was supported in the panther story condition but not in the uprising condition--significantly higher comprehension scores were observed in the expository condition as compared to the news condition for the panther story. Again, no differences were found between the narrative and expository structures. Hypothesis 9 was not supported for either story.

Summary

The three hypotheses focusing on short-term and long-term retention of the text content were partially substantiated. Significantly more information appeared to be recalled in the short term from the narrative and expository versions of both stories as compared to the news versions. Significantly higher long-term recall of the narrative and expository structures as compared with the news structure was found for the panther passage but not for the uprising passage. No substantial differences in recall, either short-term or long-term, were apparent between subjects who read the narrative versions of the stories versus those who read the expository versions.

The hypotheses which predicted that comprehension of a story's content would be affected by manipulation of the story's structure were not fully supported. Subjects did not appear to

have significantly better comprehension of the narrative versions of either passage as compared with the news versions. Subjects did seem to recall the expository version of the panther passage better than the news version, but no such pattern was observed for the uprising passage. No substantial differences in comprehension were found between the narrative and expository versions of either passage.

In-depth analysis of the recalls showed that key facts were equally well remembered in all three versions of the panther passage, but only well remembered in the expository and news versions of the uprising passage.

Some Ramifications: Correspondence of Strength of Text Schema with Recall and Comprehension

The statistical analyses described above indicated that the structure of a passage had a marked influence on readers' overall recall of the passage. In general, readers demonstrated superior net recall of the information in stories ordered according to narrative structures than of stories according to an "inverted pyramid" news structure. Mean recall scores for the expository passages were also higher than for the news passages, though these differences in long-term recall were statistically significant only in the case of one story.

These observed phenomena would best be explained in terms of schema theory: recall of the narrative and expository texts would

be better if readers' schemas for the narrative and expository structures were better developed than their schemas for the news structure. In general, this should hold true for most individuals. Research indicates that narrative or story grammars are the text structures first acquired by most readers (Applebee, 1978). Expository structures are introduced in the early school years. Exposure to news structures occurs much later in developmental terms; thus, logically, news structure schemas would not be generally as firmly instantiated or as elaborate as schemas for the more familiar narrative and expository structures. In addition, regular newspaper readers would have better news structure schemas than those who do not read newspapers frequently.

Analysis of the data seemed to partially support this theoretical explanation in that the mean schema score for the narrative structure was generally higher in both story conditions than the mean schema score for news structure (see Table 5).

However, subjects generally seemed to possess better developed news schemas than expository schemas, although recall of expository text was higher in both groups (Table 5). These results run contrary to the relationships predicted by schema theory, but may be a function of instrumentation, since the story used for the unscrambling task assessing strength of text schema was parsed into more elements than the news task.

Table 5

Mean strength of text schema scores

	Strength of Text Schema		
	Narrative	Expository	News
Panther Passage	96.6	52.9	71.6
Uprising Passage	96.2	58.1	83.3

Scatterplots of short-term recall scores against strength of text schema scores clarified, to some extent, the association between these two variables.

Although the preliminary findings and the schema-based models of memory point to a strong positive correlation between short-term recall and strength of text schema, subjects' scores within each experimental condition were not distributed across a wide range; rather, they tended to clump together, violating the underlying assumption of the Pearson product-moment coefficient that a straight line is the model for the relationship under scrutiny. It is probable that an association exists between text schema and short-term recall of a passage, but such an association could only be measured using a larger group of subjects whose scores on both measures were distributed over a wider numerical range, so that any linear relationship between the two variables could be observed and analyzed.

The inital F and t-tests indicated that altering the structure of the stories had no significant effect on

comprehension of the stories' content. Thus differential comprehension of the stories is a function of some factor other than story structure.

Comprehension was measured in this study partly in terms of literal or factual information drawn from the stimulus texts and partly in terms of inferential and evaluative ability. The latter two skills depend almost entirely on readers' prior knowledge of the topic of the text. Thus, content schemas might supercede structure schemas insofar as comprehension is concerned. Such a finding would be consistent with results obtained by Ohlhausen and Roller (1988), who found that when texts were well-structured, i.e. when they closely followed a familiar pattern of organization, content schemas played a more important role than text structures in the processing of the text content.

This idea was tested by comparing the comprehension scores of subjects who indicated lov interest in the story topic with those of subjects who indicated high interest in the story topic. A t-test comparing the mean comprehension scores of subjects in each group was conducted.

The results bear out the idea that greater interest in a story's content affects the comprehension of the story. Readers were asked to respond to the question, "Are you interested in keeping up with environmental and wildlife conservation issues" before reading the panther story. Those who read the uprising

story responded to the question, "Are you interested in keeping up with international news events?" Responses to this question were used as a measure of interest in the story's content.

Mean comprehension overall was, as expected, higher for the high-interest group (M = 54.84) than for the low-interest group (M = 41.43), t (104) = 2.72, p = 0.004. (see Table 7, below).

Table 7

Comparison of comprehension scores of subjects with high topic interest versus subjects with low topic interest

	N	MEAN	SD	SE	T	DFP
High interest	37	54.8	24.82	4.08	2.72	10004
Low interest	67	41.4	23.62	2.89		

High interest may be an indicator of high prior knowledge of a topic; on the other hand, it may simply result in more careful text processing which would lead to higher comprehension.

General Summary

Overall, it was found that altering the structure of news stories had a significant effect on the short-term and long-term recall of those stories but not on subjects' comprehension of the stories. In the short term, subjects remembered stories that followed narrative and expository structures better than stories following an inverted pyramid news structure.

Subjects' overall comprehension was not significantly

different in any of the three structural conditions of either stimulus passage. Interest in the topic of the passage was found to significantly influence comprehension of story content.

Discussion

Theoretical Implications and Suggestions for Further Research

The results of the research support the general hypothesis that story structure affects recall of story content. This result can be explained on the theoretical grounds that generally, readers have better-developed schemas for the structures of narrative and expository text, to which they are exposed early in life, than for the structure of news text, which is often first encountered in adolescence or later (see Nolan, 1989). The data indicate that readers' structural schemas for narrative texts are indeed significantly stronger than their schemas for news text.

Although the experimental data obtained from this research did not establish that readers' structural schemas for expository text were significantly stronger than their schemas for news text, this result is possibly a consequence of poor instrumentation in the choice of story used for assessing strength of expository text schema.

Readers' comprehension of the stories appeared to depend much more on their connection with the stories' content than on the structure of the passage, since no significant differences

were found in comprehension scores in the three story structure conditions. Prior knowledge has long been acknowledged as a significant factor in the comprehension of written text (Pearson, Hansen, & Gordon, 1979; Stahl & Jacobson, 1986; Just & Carpenter, 1984). This study indicates that it may be far more influential than story structure when a reader is called on to make text-based inferences and judgements. It possible that some degree of interaction may occur between prior knowledge of story content and text structure.

A few previous studies in mass communication have addressed the effects of altering the organization of news stories, but most of these were fairly informal studies wherein the texts used were not parsed according to identifiable underlying grammars, the structures were not systematically altered to adhere to those grammars, and the findings did not have theoretical support (see Donohew, 1982; Housel, 1984; Thorndyke, 1977; Nolan, 1989). The results of these studies appear to directly contradict the results obtained in the present research. An explanation of this could be that the roughly "chronological" ordering of the events in the stimulus stories used in the above experiments was not recognized by the subjects as a well-formed narrative structure. The terminal nodes in the Mandler and Johnson (1977) story grammar, on the other hand, have been identified as the common underlying elements of basic simple stories. Since the narrative passage used in this experiment closely followed the Mandler and

Johnson story grammar, subjects' story schemas may have been activated and the stories more easily processed.

In this study, subjects were instructed to read the stimulus stories and later to recall them and answer questions about them. This procedure did not really simulate the normal newsreading process. Thus, while the study isolated the variable of story structure and examined its effects on reading recall and comprehension, the actual impact of varying the structure of a news story on these processes during normal newsreading has still not been evaluated. A study in which the stimulus stories are embedded in a facsimile newspaper might be an improvement on the method used here.

The results observed in the experiment could have been caused by interactions between the text structures and the strength of subjects' text schemas as well as perhaps their schemas for the content of the text. The method employed in this study did not include the assessment of each subject's schema for all three types of structure--news, narrative, and expository. Had these been measured, direct statistical comparisons of strength of schema, recall and comprehension might have been attempted. Alternatively, the experiment could have involved some sort of repeated-measures design that would have allowed for a more complex and sensitive analysis of the observed variations in recall and comprehension.

In addition, the differences observed in this experiment between the two story conditions could have been due to the differences in content in the sense that some types of content may be more suitable to a particular type of text structure--the uprising story, for instance, lacked a protagonist, an essential element of a true narrative. This may have affected subjects' cognitive processing of the text content in the different structural conditions.

The greater strength of readers' schemas for certain types of text structure, as observed in this research, was explained in terms of the developmental acquisition of text schemas. Little information is available about the acquisition of text schemas for news messages. Information about this aspect of the formation of news schemas would increase our understanding of news readers and their orientations to news messages.

This study focused solely on newspaper stories. An examination of text structures used in other mass media and the effects of altering them might reveal more about information gain from various sources of news.

Implications for the Field

On the basis of the patterns of recall and comprehension observed in this study, it would appear that the "inverted pyramid" typically used as an organizational model by news writers is not the text structure that would facilitate optimum

recall. Past research has supported the view that narrative writing is better received by readers than news stories (Donohew, 1982; Smith & Voelz, 1983). As Berner (1983) has pointed out, not all news stories are suited to being written in a narrative fashion. "The nature of the news," he writes, "is an element in determining the packaging of the news" (p. 39). Perhaps newswriters could learn to take the nature of the story's content into consideration when writing, so that the type of structure best suited to the text could be used.

Nolan (1989) writes that his investigations indicate that

> story forms, be they natural phenomena or not, can be learned and unlearned through socialization. And like many learned things, conscious awareness of their attributes and experience in their use seem to make them more readily usable. (p. 132)

If this is the case, it is possible that instruction in the organization of news stories and other types of text could also benefit newsreaders in that it might facilitate comprehension of and memory for news, as well as increasing ease of reading. Programs like Newspapers In Education could incorporate instruction about text structure into classroom lessons, thus increasing young readers' ability to assimilate the information in news stories. The effects of such instruction could be measured to assess its usefulness as an educational tool.

The inverted pyramid structure of news was developed mainly as a convenient adaptation to the technical requirements and limitations of the newsroom and the production process. However,

as technology advances, the restrictions placed on writers and editors in terms of story length and structure are changing. With the introduction of desktop publishing and electronic pagination of newspapers, the need for last-minute composing-room shortening of stories is decreasing. Computerized newsrooms allow for more creative editing of stories, even on deadline. A reconsideration of the inverted pyramid and its utility as the basic news structure is in order. The results of this investigation might indicate that the pyramid may no longer be the optimum framework for the printed news message.

An alternative perspective on the results obtained in this research, of course, exists. Recall and comprehension of the content of a news story are not necessarily the best measures of the effectiveness of the story. As one of the reviewers of this paper pointed out, it may be that news stories are designed to introduce the reader to a subject, to inform of its existence, and to prompt for further attention in the event of major or continuing stories. Thus, if the reader's goal in newsreading is perfunctory rather than extensive information, it may be that interest in the story's content is the overriding influence on the processing of information in news messages.

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ENDNOTES

1. In this document, the word "schema" will be pluralized as "schemas" rather than as "schemata", as per the style used by Mandler (1984, p. 2, note 1).

2. The inverted pyramid story structure is characteristic of hard news stories, i.e. news stories that are factual accounts of events, usually with a time element. Soft news stories (news stories with a human interest focus, written in a lighter vein) or feature stories often do not follow the inverted pyramid structure. The present research is therefore confined to hard news stories. For a more detailed classification of news story types, see McCombs, Shaw, and Grey (1979), Handbook of Reporting Methods, p. 293.